Polar polycyclic aromatic compounds (polar PACs) occurence and origin : issues and requirements for future investigations

Bruno Lemiere, Pierre Faure, Catherine Lorgeoux, Stéfan Colombano, Alain Saada, Staffan Lundstedt, Matt Tysklind

POLAR POLYCYCLIC AROMATIC COMPOUNDS (polar PACs) OCCURENCE AND ORIGIN: ISSUES AND REQUIREMENTS FOR FUTURE INVESTIGATIONS

B. Lemiere[1], P. Faure[2,3], C. Lorgeoux[4,5], S. Colombano[1], A. Saada[1],

S. Lundstedt[6], M. Tysklind[6]

1. BRGM, 3, avenue Claude Guillemin - BP 36 009, 45 060, Orléans Cedex 2, France

2. CNRS, UMR 7360 LIEC, BP 239, 54506 Vandœuvre les Nancy, France

3. Université de Lorraine, UMR 7360 LIEC, BP 239, 54506 Vandœuvre les Nancy, France

4. CNRS, UMR 7359 Géoressources, BP 239, 54506 Vandœuvre les Nancy, France

5. Université de Lorraine, UMR 7359 Géoressources, BP 239, 54506 Vandœuvre les Nancy, France

6. Umeå University, Department of Chemistry, SE-901 87 Umeå, Sweden

Polar polycyclic aromatic compounds (polar PACs) are less known than PAHs, and neither monitored nor regulated anywhere, despite their potential harmfulness and greater mobility. They were rarely intentionally produced, and they occur mainly as PAH metabolites. They often occur at the same sites (gasworks, coke plants, wood treatment sites) as PAHs and other PACs but have been mostly overlooked. Other potential sites include wood tar production and oil refineries or storage affected by accidents. PAH remediation treatments, such as thermal desorption or chemical oxidation may have promoted the formation of oxy-PACs while applied, along with the mitigation of regulated PAHs. According to existing regulations, the site contamination level related to the sum of PAH was reduced, but the actual risk may have been increased. In order to identify potential risks, the monitoring of oxy-PACs is required. However, analytical capabilities are not developed, data on oxy-PACs are scarce and research is still needed.

Available results from contaminated site databases and from our investigations suggest that polar PACs may constitute between 10 and 20% of total PACs in soil, and their occurrence in shallow groundwater is often overlooked at contaminated sites. Their potential impact on risk analysis is largely unknown and may be underestimated, as their transfer properties are by far less favourable than those of PAHs. Their monitoring would require analysis standards and commercially available analytical services before any regulatory approach is undertaken. This is most important for sustainable remediation of PAH-contaminated sites.

Keywords: Polar PACs, monitoring, remediation